## REMARKS

Overview of the Office Action

Claim 13 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite.

Claims 1-7, 9, 11-13, and 16 have been rejected under 35 U.S.C. 102(e) as anticipated by U.S. Patent No. 6,465,808 to Lin ("Lin").

Claims 10 and 15 have been rejected under 35 U.S.C. 103(a) as unpatentable over Lin in view of U.S. Patent No. 6,673,254 to Marshall et al. ("Marshall").

Claims 17-18 and 20-25 have been rejected under 35 U.S.C. 103(a) as unpatentable over Lin in view of U.S. Patent Publication No. 2001/0042866 to Coman et al. ("Coman").

Claims 8 and 19 have been rejected under 35 U.S.C. 103(a) as unpatentable over Lin and Coman in view of U.S. Patent No. 6,693,352 to Huang et al. ("Huang").

Status of Claims

Claim 14 has previously been canceled.

Claim 8 has now been canceled.

Claims 1 and 7 have been amended.

Claims 26 and 27 have been newly added.

Claims 1-7, 9-13 and 15-27 are now pending.

Rejection of claim 13 under 35 U.S.C. 112, second paragraph

The Office action states that claim 13 is indefinite because it is unclear how the contact elements are related to the transverse conductivity of the p-doped layer so it can be energized. The Office action further states that it is unclear how the relationship is determined between the

p-doped layer and the distances in relation to how it is energized. Applicants submit that how the contact elements are related to the transverse conductivity of the p-doped layer so that it can be energized is clearly detailed in Applicants' published specification.

Referring to paragraphs 0030-0033 of Applicants' published specification, the contact elements are arranged at the nodes of a square grid. In this case, it is advantageous if the distances between the contact elements are chosen based on the transverse conductivity of the p-doped layer. The transverse conductivity leads to an expansion of the current path, which is limited to the diameter of the contact element at the contact point between the contact element and p-doped layer in the direction of the active zone.

This optimum distance between the contact elements is determined when current cones, which arise from the expansion of the individual contact elements on the surface of the active zone, touch one another, which ensures that the entire surface of the active zone is energized. Hence, the distances between the nodes in the square grid are chosen such that the current cones of adjacent contact elements touch one another, or overlap, on the surface of the active zone, so that ultimately only very little or no area of the active zone remains unenergized.

Further, the arrangement of the contact elements at the nodes of a square grid may also be optimized with regard to the coverage. For the case where whole-area energizing of the active zone is required, the nodes of the square grid are placed a relatively short distance from one another in order to ensure that the region in the center of each square can be reliably energized. However, this leads to a relatively large overlap of the current cones between two directly adjacent contact elements. In this respect, it is advantageous if the contact elements are arranged at the nodes of a differently configured regular grid. For example, the contact elements can be

positioned at the nodes of a hexagonal grid. In addition to the nodes of the hexagonal grid, a further contact element is also positioned in the center of each hexagon.

Applicants submit that withdrawal of this rejection is now in order, and such action is respectfully solicited.

Summary of subject matter disclosed in the specification

The following descriptive details are based on the specification. They are provided only for the convenience of the Examiner as part of the discussion presented herein, and are not intended to argue limitations which are unclaimed.

A radiation-emitting semiconductor component is provided. The semiconductor component has a semiconductor body, which has an active zone, in which, for the purpose of electrical contact connection, a patterned contact layer is applied on a surface of the semiconductor body. Interspaces are distributed over the contact layer and are provided for the purpose of forming free areas on the surface, which are not covered by the contact layer. The free areas are covered with a mirror.

Descriptive summary of Lin

Lin discloses a method and structure for forming an electrode on a light emitting device. A transparent electrode or a reflective electrode is formed on a p-type gallium nitride-based compound semiconductor. The electrode includes opaque ohmic contact dots formed on the p-type gallium nitride-based compound semiconductor and a transparent conductive layer (or a light reflective conductive layer) covering the p-type gallium nitride-based compound semiconductor.

Claims 1-7, 9, 11-13, and 16 are allowable over Lin under 35 U.S.C. 102(e)

The Office Action states that Lin teaches all of Applicants' recited elements.

Independent claim 1 has been amended to point out more clearly the subject matter that Applicants' regard as the invention. Specifically, claim 1 has been amended to incorporate the subject matter of claim 8. Claim 1 is now directed to a radiation-emitting semiconductor component that includes a patterned contact layer applied on a surface of the semiconductor body for electrical contact connection, wherein the contact layer has a thickness which is less than 100 nm.

Lin fails to teach or suggest the thickness of any of the electrodes, the opaque ohmic contact dots, and the conductive layer. Therefore, Lin fails to teach or suggest a contact layer that has a thickness, which is less than 100 nm, as recited in Applicants' amended independent claim 1.

With respect to claim 8, which has now been incorporated into currently amended claim 1, the Examiner cites col. 5, lines 10-19 of Huang as teaching that the contact layer has a thickness of less than 100 nanometers. Applicants respectfully submit that these passages have been misinterpreted.

Huang discloses a contact structure for group III-V and group II-VI compound semiconductor devices, generally used as a light emitting diode (LED), a laser diode (LD), or a photodiode (PD). The contact structure includes a stack of multiple layers of metals and transparent conducting oxide. The first layer of the contact structure is in direct contact with the semiconductor and includes at least one of indium, tin, nickel, chromium and zinc, or an alloy or combination of layers thereof. The second layer of the structure is in direct contact with the first layer and includes at least one of Indium Tin Oxide, Indium oxide, and Tin oxide, or a

combination thereof. The optional third layer of the structure contacts the second layer and includes at least one of Au, Al, Pt, Pd, Mo, Cr, Rh, Ti.

Huang explicitly teaches "to provide a contact structure with high optical transparency" (see col. 2, lines 36-37), where the structure is formed of two unstructured transparent layers 36A and 37A, wherein layer 36A "has a preferred thickness in range approximately between 5 Angstroms and 400 Angstroms" (see col. 5, lines 15-17). Thus, Huang teaches a layer thickness for a transparent continuous metal layer, which is not patterned as recited in Applicants' amended independent claim 1. Thus, there is no motivation provided by Lin to apply the thickness of a continuous transparent metallic layer to the opaque ohmic contact dots since such a combination would render the contacts dots transparent, which contradicts the method and structure taught by Lin. Therefore, the combination of the electrode that includes opaque ohmic contacts taught by Lin and the thickness of the transparent metallic layer taught by Huang is improper.

In view of the foregoing, Applicants submit that Lin and Huang fail to teach or suggest the subject matter recited in Applicants' independent claim 1. Specifically, Lin and Huang fail to teach or suggest radiation-emitting semiconductor component that includes a patterned contact layer applied on a surface of the semiconductor body for electrical contact connection, wherein the contact layer has a thickness which is less than 100 nm.

Dependent claims

Claims 2-7, 9, 11-13, and 16, which depend directly or indirectly from the independent claim 1, incorporate all of the limitations of claim 1 and are, therefore, deemed to be patentably

distinct over Lin and Huang for at least those reasons discussed above with respect to independent claim 1.

Claims 10 and 15 are allowable over Lin and Marshall under 35 U.S.C. 103(a)

The Office Action states that the combination of Lin and Marshall teach all of Applicants' recited elements.

As previously discussed, Lin does not teach or suggest the subject matter recited in Applicants' independent claim 1.

Because Lin does not teach or suggest the subject matter recited in independent claim 1, and because Marshall does not teach or suggest the elements of claim 1 that Lin is missing, the addition of Marshall to the reference combination does not remedy the non-obviousness of the claims.

Claims 10 and 15, which depend directly or indirectly from the independent claim 1, incorporate all of the limitations of claim 1 and are, therefore, deemed to be patentably distinct over Lin and Marshall for at least those reasons discussed above with respect to independent claim 1.

Claims 17, 18 and 20-25 are allowable over Lin and Coman under 35 U.S.C. 103(a)

The Office Action states that the combination of Lin and Coman teach all of Applicants' recited elements.

As previously discussed, Lin does not teach or suggest the subject matter recited in Applicants' independent claim 1.

Because Lin does not teach or suggest the subject matter recited in independent claim 1, and because Coman does not teach or suggest the elements of claim 1 that Lin is missing, the addition of Coman to the reference combination does not remedy the non-obviousness of the claims.

Claims 17, 18 and 20-25, which depend directly or indirectly from the independent claim 1, incorporate all of the limitations of claim 1 and are, therefore, deemed to be patentably distinct over Lin and Coman for at least those reasons discussed above with respect to independent claim 1.

<u>Claim 8 and 19 are allowable over Lin, Coman, and Huang under 35 U.S.C. 103(a)</u>

The Office Action states that the combination of Lin, Coman, and Huang teach all of Applicants' recited elements.

As previously discussed, Lin and Coman do not teach or suggest the subject matter recited in Applicants' independent claim 1.

Because Lin and Coman do not teach or suggest the subject matter recited in independent claim 1, and because Huang does not teach or suggest the elements of claim 1 that Lin and Coman are missing, the addition of Huang to the reference combination does not remedy the non-obviousness of the claims.

Claim 8 has been canceled. Claim 19, which depends indirectly from the independent claim 1, incorporates all of the limitations of claim 1 and is, therefore, deemed to be patentably distinct over Lin, Coman, and Huang for at least those reasons discussed above with respect to independent claim 1.

Newly added claims 26 and 27

Independent claim 26 has been newly added. This newly added claim contains features that can be found in the original claims 1, 9, and 10.

Independent claim 27 has been newly added. This newly added claim contains features that can be found in the original claims 1, 16, and 18.

With respect to newly added independent claim 26, Lin does not teach or suggest contact elements having the form of cylinders. Instead, Lin teaches ohmic contact dots that have a half circular shape.

The Examiner cites col. 4, lines 25-28 and lines 35-37 of Marshall as teaching a highly effective, micron-scale micro heat structure in order to "realize a highly effective thermal insulator" and "to produce a micro heat barrier having an apparent thermal conductivity a factor 10-100 times lower than the best insulation". Such a micro heat barrier structure can be used to thermally isolate heat sources, as shown in Figs. 9 and 15 of Marshall. Further, Marshall teaches using non-metallic microposts made of poor thermal conductors (e.g., silicon, germanium, or gallium arsenide) to minimize thermal conduction through the support posts (see col. 4, lines 39-44 of Marshall). Because silicon, germanium, and gallium arsenide are semiconductors but not metals, the microposts are not suitable for forming ohmic contact dots as taught by Lin. Moreover, Lin discloses that the ohmic contact dots are in perfect ohmic contact with the p-type GaN layer (see col. 4, lines 13-16 of Lin). It is well known by those skilled in the art that good ohmic contact (i.e., low electrical contact resistance) implies good thermal contact with low thermal resistance. Therefore, the micro heat barrier structure of Marshall is completely different from the semiconductor light emitting device of Lin regarding the individual elements and their function.

Regarding the Examiner's reasoning on page 5 of the Office Action, the Examiner appears to conveniently pick a single feature of a single element disclosed by Marshall (e.g., the shape of the microposts), which has specific properties (e.g., low thermal conductivity and non-metallic) and combines it with a completely unrelated element disclosed by Lin (e.g., the metallic ohmic contact dots that provide good electric contact to a semiconductor layer). Therefore, the Examiner's combining the teachings of Lin and Marshall is improper as neither of the cited references provides a motivation for such a combination.

Therefore, Lin and Marshall, whether taken alone or in combination, fail to teach or suggest the subject matter recited in Applicants' newly added independent claim 26.

With respect to newly added independent claim 27, Lin fails to teach or suggest the interspaces in the patterned contact layer being filed with a filler in order to at least partially planarize the surface of the patterned contact layer, wherein the filler contains a transparent and electrically insulating material.

The Examiner cites paragraph 0023 of Coman as teaching that the filler contains a transparent and electrically insulating material. Applicants submit that the cited passages have been misinterpreted. Coman discloses an InAlGaN light emitting device with p-side ohmic contacts and a mirror stack. Nothing is taught or suggested regarding a filler containing a transparent and electrically insulating material. Instead, Coman discloses only a mirror.

Further, newly added claim 27 recites "wherein the interspaces are filled with a filler in order to at least partially planarize the surface of the patterned contact layer" and "a mirror for covering the free areas." The filler and the mirror recited in Applicants' newly added claim 27 are clearly two different elements. In contrast, Coman discloses only a mirror, which is deposited in addition to the p-side ohmic contacts.

Therefore, Lin and Coman, whether taken alone or in combination, fail to teach or suggest the subject matter recited in Applicants' newly added independent claim 27.

Conclusion

In view of the foregoing, Applicants respectfully request reconsideration and withdrawal of all outstanding rejections, and the allowance of all pending claims, in due course.

Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is invited to telephone the undersigned in order to facilitate an early resolution of any outstanding issues.

Respectfully submitted,

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